THE
ULSTER MEDICAL JOURNAL

PUBLISHED ON BEHALF OF THE ULSTER MEDICAL SOCIETY

Vol. XXXV 1966 Nos. 1 and 2

FIFTY YEARS—A RADIOGRAPHIC RETROSPECT

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ONE DAY Dr. R. S. Allison, who is the Archivist to the Royal Victoria Hospital, suggested that I put down on paper some memories of my experiences as a Radiographer and my recollections of the history of the X-Ray Department in the Royal Victoria Hospital, Belfast. The 'Royal' is so known to the entire population of Belfast and so I will continue to call it in this paper. The X-ray department and I grew up together, and I belong to that group of pioneers who, like the pioneers in any new technique, learnt my job by experience, for in those days there was not and could not have been any official training or any recognised qualification. It was perhaps the absence of any official qualification that encouraged me in my later days to go for so much competition work, but I feel that to leave out these aspects of my life would lessen the interest of what I have to say.

I am an East Anglian and my home town is Norwich, where in the exciting period of 1914-15 I was studying for the Minor Pharmaceutical examination. I was also a local member of the Red Cross Society and used to assist with the admission of war casualties at the Norfolk and Norwich Hospital where I spent some time in the X-ray department.

Early in 1915 I volunteered to serve abroad as a Red Cross worker and soon found myself in France at a hospital in Wimereux near Boulogne. This was a converted hotel and was known as Lady Hadfield's Anglo-American Red Cross Hospital. Having an elementary knowledge of X-ray and pharmacy I was appointed to take X-rays and dispense stock medicines. My main interest was undoubtedly X-ray work, although the apparatus available was primitive, consisting of a 24 inch induction coil with a hand cranked mercury interruptor, operated like an egg beater, while power was obtained from a bank of accumulators. Speaking of mercury interruptors, I still remember when I ruined a gold signet ring given me by my parents when leaving for France. Mercury in the interruptors got very dirty with use and required to be frequently cleaned by squeezing it with the hands through a cloth or rag. Once when carrying out this procedure I forgot to remove my gold ring, but the mercury did not and formed an amalgam with it. All my efforts failed to remove the mercury, resulting in the ring breaking into six pieces a few days later. We used gas X-ray tubes and great care was necessary

FIG. 1. *Gas Gangrene of Knee and Leg. First World War*

to avoid overloading them, otherwise they would be useless due to the vacuum being reduced. Films had not been thought of for X-ray work and we used glass plates which had to be developed in dishes in a bathroom. Pyro-Hydroquinone developer was used for processing the negatives and so skiagraphers, as we were known in those days, bore the trade mark of brown stained finger nails due to handling the plates in this solution. The plates were propped up on pieces of wood in the bath for washing. Figure 1 shows gas gangrene in the leg and was taken in 1916.

Exposure times even for extremities were long, and the odd barium meal was attempted but with little success, for the patients had difficulty holding their breath for the exposure time required, about 30 seconds, and we had difficulty hand cranking the interruptor at a constant speed. Later barium-platino-cyanide intensifying screens became available which certainly did reduce exposure times, but the screens at that time had one big fault, namely 'lag' and it was necessary to run outside to expose the screen to daylight when changing plates in the wood cassette, otherwise the latent image of the first exposure would be superimposed on the next one taken. Little was known of the radiation hazard in those days and we occasionally screened our hands to test the output of the X-ray unit and tube. Our greatest concern was to avoid electrical shock from the bare high tension wires suspended from the ceiling and connecting the induction coil with the X-ray tube.

I was fortunate in working with many eminent surgeons and physicians at the Anglo-American Hospital, including Lord Dawson of Penn and Major Valadier, Consultant Oral and Facial-maxillary Surgeon to the B.E.F. It was here that I met Colonel Andrew Fullerton, Consultant Surgeon, A.M.S., and John Campbell, F.R.C.S., who was attached to the British Red Cross Society, both of whom were from Belfast.

Before leaving the Anglo-American Hospital for home at the end of the War Colonel A. Fullerton and Mr. John Campbell suggested that I might like to do X-ray work in Belfast, to which I readily agreed. Arriving home in Norwich and hearing nothing from Belfast I reluctantly took up my pharmaceutical studies again, but in April 1919 a telegram arrived instructing me to report to Dr. J. C. Rankin, electrical department, Royal Victoria Hospital. On receipt of this welcome news I threw my pharmaceutical books away and departed for Belfast, arriving Easter Tuesday 1919. I found the X-ray room situated on the first floor of the King Edward Building of the hospital and under the charge of Dr. Rankin and Sister Miller. The X-ray equipment costing less than £500 was most impressive in appearance and the noise generated, but had a low output. So called flash exposures were made by the dropping of a weight down a tube, the exposure being controlled by the distance of the weight dropped. Glass X-ray plates and gas X-ray tubes were still used, but the patients requiring X-ray only numbered 6 to 8 per day.

By 1920 X-ray equipment with increased power and output became available. (Figure 2). A special alternating current mains was supplied to the X-ray room as most of the hospital electrical supply was direct current. This A.C. mains permitted the installation of the latest type of wax insulated high tension transformer which greatly improved radiographic results. It was, in fact, the first X-ray

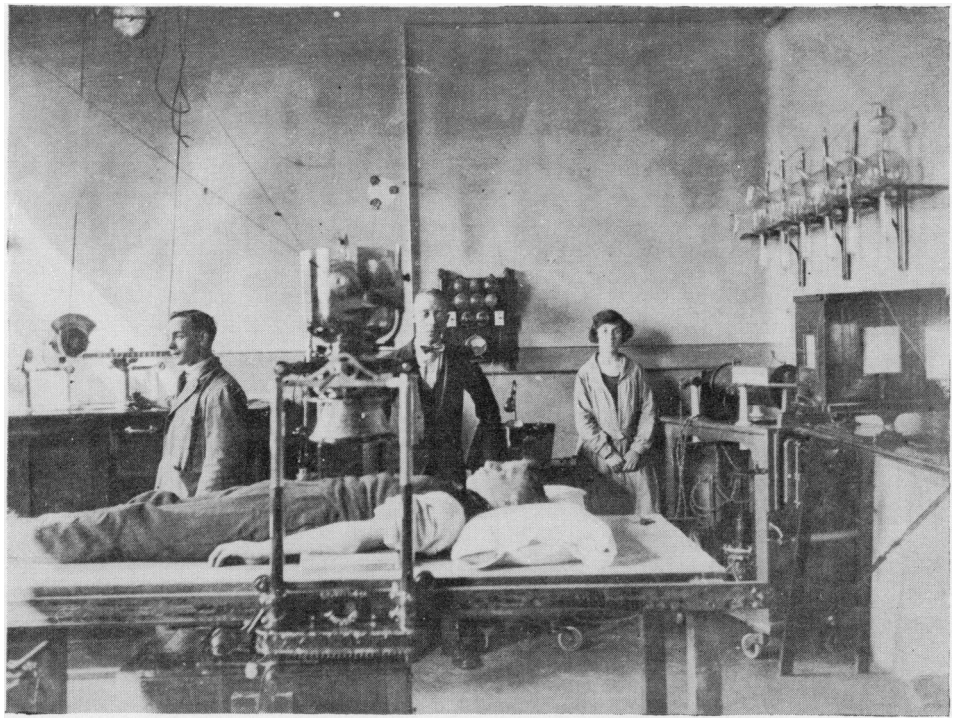

FIG. 2. *Royal Victoria Hospital. Only X-ray Room in* 1920

transformer to be used in the Royal. A mobile induction coil X-ray unit was also purchased for radiography of patients in bed when limbs were suspended in a Thomas splint and gantry. All X-ray apparatus was still non-shockproof with bare wires conveying voltages of up to 70,000 from the transformer or coil to the X-ray tube, so that to do a ward portable in those days was often quite an adventure, sometimes painful, for both radiographer and patient. The radiation hazard was by now being realised and lead rubber protective aprons and gloves were available, but radiographers had to be physically strong to work with those heavy lead aprons slung around their necks or to use their hands after struggling to don the very stiff gloves. The amount of work and demands on the department gradually increased and in 1921 Dr. Maitland Beath was appointed assistant radiologist to Dr. J. C. Rankin.

In 1921-22 Belfast was troubled by political riots and for a time a strict curfew was imposed from 11.30 p.m. to 5 a.m. and being frequently called to the Royal during the night to X-ray riot casualties it was necessary for me to obtain a night pass from the police and a permit to use a motor cycle, my only means of transport at night. These journeys were far from pleasant, particularly on the Grosvenor Road, with occasional bullets coming from side streets and from the park opposite the Royal. If on reaching the gates of the hospital I found them closed it was safer to keep riding round the road in circles until the night porter would dash out to open them.

Until 1921 no official body was recognised for the training and examination of radiographers, who were mostly men who had a technical knowledge of X-rays. It was from this group that the Society of Radiographers, London, was established and in 1922 I was successful in gaining the Diploma of that Society.

The year 1922 saw three developments which revolutionised radiography: the old gas X-ray tube with all its problems of maintaining the correct vacuum was replaced by the Coolidge hot cathode tube, and double coated X-ray films replaced the single coated X-ray plates, while later the Potter-Bucky diaphragn was invented, a device to reduce the scattered radiation reaching the film. The Royal was the first hospital in Northern Ireland to instal this piece of equipment, although Dr. Beath did instal a Bucky diaphragm at "Elmwood" just before this. Its arrival created great interest. Dr. Beath and I spent a whole evening taking X-rays of our spines and pelves. I well remember the thrill and satisfaction of seeing for the very first time clear radiographs of the heavier parts of the body without the usual blurring caused by scattered or secondary radiation.

During 1923 the number of patients X-rayed was in the region of 4,800 and the steadily increasing demands for X-ray examinations necessitated moving the X-ray department to the main floor of the hospital, so providing accommodation for a second X-ray unit.

In 1926 it became very apparent that more people were required for the taking of X-rays in the Royal and that they should be qualified according to the Society of Radiographers standards. During 1926 I accepted and trained a male student, my first student to qualify. Now many of the radiographers whom I trained hold senior posts in the Royal, throughout Northern Ireland, and abroad.

In 1927 Dr. F. P. Montgomery, M.C., was appointed assistant radiologist.

It was some time in 1927 that Dr. J. C. Rankin arranged for a mobile X-ray unit, a coil unit, to be transported and set up in the yard of Mr. Ewing Johnston, a veterinary surgeon of May Street, Belfast (Figure 3). Our mission was to X-ray the leg of a well known racehorse, 'Jerpoint', a most unhelpful patient, for every time we attempted to take the X-ray he backed away, due to the electrical discharge from the bare high tension wires. Eventually, with his back end against the wall, the examination was successfully carried out and a fractured shin bone diagnosed.

On another occasion Dr. Rankin, always interested in the unusual X-ray, arranged for a horse with a slight leg injury to be walked to the Royal for an X-ray. It was a Saturday evening in summer and instructions were given for the horse to be brought in by the lower gate and round to the old workshops at the back of the hospital, where a portable X-ray machine was set up. After waiting half an hour with no sign of the animal, I went round to the front of the hospital, when to my horror I saw a man trying to take the horse into the hospital through the extern door, much to the amusement of spectators gathered at the gate lodge. The man in charge of the horse insisted that he was acting on instructions, but the sister in charge of extern was equally determined that no horse was coming into her extern. My timely arrival saved the situation and the horse was led away to the appointed place.

It was in the early thirties that I first considered entry to the various radiographic essays, competitions and exhibitions, realising that work of this nature would

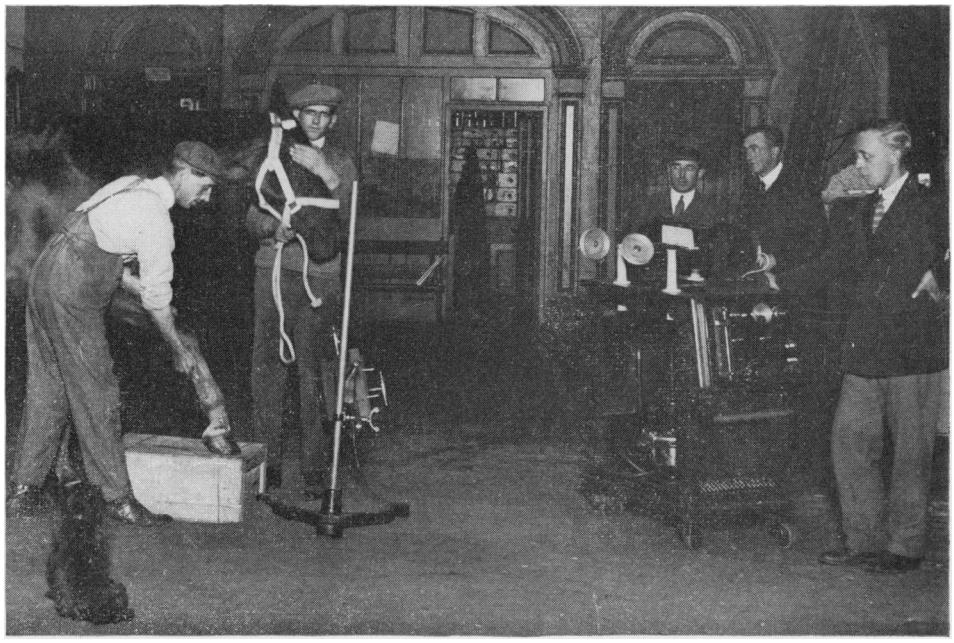

FIG. 3. *Veterinary radiography by Dr. Rankin and R.M.L.*

increase my professional knowledge. In 1931 and 1933 I gained the Archibald Reid Memorial Medal of the Society of Radiographers for theses on radiographic techniques, and am the only radiographer to have two such medals, while from 1934 to 1941 I exhibited, by invitation, medical and technical radiographs in Stockholm, Czechoslovakia, Rochester and other cities in the U.S.A. In 1935 the Western International Salon invited me to contribute to an album of photographic art for presentation to King George V and Queen Mary. But the two distinctions which gave me the greatest pleasure were my election in 1936 to the Foundation Fellowship of the Society of Radiographers and the recognition of my exhibits in 1941 by the award of the Rodman Medal of the Royal Photographic Society of Great Britain.

During the years of the 1939-45 war it was somewhat difficult coping with all the radiographic demands. In addition to being called to the Royal when air raid alarms were sounded it was, because of the reduced medical staffs of the Royal, necessary for the radiographers to work longer daylight hours and postpone the X-ray work associated with Smith Peterson pins, ventriculograms and other surgical procedures until night time. Although we frequently worked twelve hours or more during the war, life was not without amusing incidents. One of these concerns an emergency telephone call to my house one Sunday morning from a nursing home, at which a Belfast surgeon, Mr. J. S. Loughridge, was attempting to remove kidney stones. Being unable to locate them he requested my help. Following a hurried drive to the Royal to collect a portable X-ray machine,

developing dishes, chemicals and small films, I made for the nursing home and set up the X-ray machine on a theatre trolley and two X-rays were taken. Then I had difficulty finding a dark room or cupboard in which to develop the films, but eventually it was suggested that the matron's bedroom had the best blackout in the building. Even this was not dark enough, so bedclothes were draped around the bed to the floor. I then crept under the bed with my dishes and chemicals, instructing a nurse to wait outside the door and knock when five minutes had elapsed because I was working in complete darkness. From the films taken the stones were located and successfully removed. The matron was at church.

During half a century of radiography one would expect and indeed welcome unusual and difficult cases, for not only do they provide a break from routine work but extend one's knowledge of radiographic technique. The following are some of the interesting investigations I have undertaken. On leaving a breakfast table a mental patient informed the hospital nurse that she had swallowed a spoon. Examination of the patient's throat and patient's clothing revealed no spoon. So the nurse duly reported the matter to sister and so on to the doctor and medical superintendent who, although no clinical signs were present, thought an X-ray advisable and requested me to carry out the investigation, with apologies for troubling me as the story appeared so ridiculous. However X-ray examination did reveal a dessertspoon in the stomach. The patient was admitted to the Royal for operation and the spoon successfully removed.

A man with every appearance of being ill arrived at the X-ray department with a history of having swallowed his false teeth during the night. Although the distressed condition of the patient gained him much sympathy from other patients, X-ray of the whole gastro-intestinal tract failed to show any sign of the teeth. His wife then arrived in the department with the missing denture which she had found in his bed. I never saw a patient recover so quickly.

During the first World War I noticed a Frenchman wearing abnormally large shoes. After being tactfully questioned he agreed to submit to an X-ray of his feet. The radiograph revealed that he had six metatarsals and seven toes on each foot.

Some years ago the late Mr. Cecil Calvert walked into the X-ray room at the Royal with a chest X-ray showing a screw in the main bronchus. Then producing six iron screws he asked me to pick out the one of corresponding size to that shown on the radiograph, as the size of the screw would determine the bronchoscope necessary for its removal. The unknown degree of magnification on the film made a snap decision impossible. However, I endeavoured to assist by using the following procedure. Placing the patient supine on the X-ray table so that the posterior chest wall was in close contact with a double wrapped X-ray film, the distance from the film to the anterior chest wall and the tube film distance was noted. Stereo exposures were then made on one film from which the exact distance of the head and point of the screw from the posterior wall was calculated; a lateral film confirmed the degree of obliquity of the screw. Using a long loaf of bread as a phantom it was placed on its end and cut the same height as the distance from the posterior chest wall to the screw and four of the most likely screws were placed on it. From X-rays taken of the loaf with four screws on it and further calculations the identical size of screw with that in the bronchus was determined. This was confirmed after operation.

Walking along a beach I was impressed by the pattern and beauty of the seaweed lying around and wondered how it would look if X-rayed, so I collected some and made the experiment. This success prompted the thought of X-raying plants and flowers to show the delicate leaf structure and bud formation. To produce radiographs of the correct density, contrast and artistic appearance, it was necessary to experiment with many technical factors as there was virtually no latitude; these required to be varied with almost every exposure. Selection of

FIG. 4. *X-ray of Lilium longiflorum*

FIG. 5. *X-ray of Magnolia*

suitable subject matter and improved techniques resulted in radiographs suitable for exhibition purposes (Figures 4 and 5).

The Medical Officer of a local circus asked me to X-ray one of his company, a giraffe neck woman who was a native of the Shan State, Burma, to demonstrate the bone structure and contour of the neck. This lady's unusual appearance created quite an interest when passing through the extern of the Royal. It was not possible to show the cervical vertebrae because of the radiopacity of the twelve or so solid brass coils around her neck. However, a form of collar of the same material extended down and out to rest on the shoulders, this could be raised so making it possible to X-ray the shoulders and upper chest. It was found that the giraffe neck effect was really produced by the continued weight of the heavy collar depressing the shoulder girdle with compression and elongation of the upper thorax.

But now I must return to the hospital department when the number of patients requiring X-ray had now reached such proportions that extension was very necessary. Plans were prepared for a completely new department at an estimated

cost of £30,000. However, because of the war, this project was deferred and additional X-ray rooms had to be sited in any available rooms, including the King Edward Building.

In November 1940 the Royal Victoria Hospital and Radiology suffered a great loss by the untimely death of Dr. Maitland Beath. I treasure the memory of twenty years' happy and close association with Dr. Beath. His kindly friendship and sincere consideration for all hospital personnel whatever their rank or station inspired loyalty and affection. Dr. F. P. Montgomery was appointed radiologist-in-charge after the death of Dr. Maitland Beath.

By 1949 my time was fully occupied for, in addition to being superintendent radiographer at the Royal, I was organising secretary and lecturer to the now officially recognised Radiography Training School. Also as adviser in radiography to the Northern Ireland Hospitals Authority I made a survey of all X-ray departments in the Province and put forward proposals for short and long term improvements. One very interesting project was that for the Belfast City Hospital whose Management Committee asked me to plan the conversion of a large ward to two X-ray rooms and ancillary rooms.

By now I was one of the oldest members of the department and it was a very great honour when in 1951 I was awarded the M.B.E. I feel that this reflects on the prestige radiography had by that time attained, not only in the Royal Victoria Hospital but all over the North of Ireland where so many of our old students were in post.

In 1954 the many friends of Dr. J. C. Rankin were grieved to hear of his death some ten years after his retirement. Dr. Rankin had a thirst for knowledge, to further which he spent some months in Copenhagen to study the treatment of skin diseases and later to Vienna to acquire a knowledge of X-rays. Johnny Rankin, as he was affectionately known by his colleagues, possessed the gift of friendship, had outstanding versatility and technical ability and sought neither office nor preferment. His name will long be remembered by those who were privileged to know him.

By 1956 the number of radiographers in Northern Ireland was sufficiently great to justify the formation of a Branch of the Society of Radiographers. As father of the flock I was the first Chairman and also became the Branch Nominee on the London Council.

The work of the department had now increased to the point when an entirely new department became necessary and inevitably I was closely associated with the planning. Nine X-ray rooms were to be provided in the first stage.

I officially retired from the Royal in June 1959 after forty years' service, but was invited by the Belfast Hospital Management Committee to act in an honorary advisory capacity and so was able to see my old X-ray department into its new home. Retirement does not necessarily mean that a man stops working and I assisted and advised radiologists, architects and contractors with the planning of X-ray departments at Altnagelvin Hospital, Londonderry, the Ulster Hospital, Dundonald, and the Dental Hospital, Royal Victoria Hospital. Perhaps it is little wonder that in 1960 I had to give an account of myself to the B.B.C. and explain how X-ray work had grown with the years and how it had been applied to the service of mankind.

Maybe my friends thought that the old man was then finished and that it was time to close down, and in that same year I was awarded the Honorary Fellowship of the Society of Radiographers of which I was a Foundation Fellow. But there was still work to be done. In July 1962 the British Medical Association meeting was held in Belfast, at which I was invited to exhibit in the Scientific Section by the President, Sir Ian Fraser, who was my sponsor, and in 1963 I was invited by the Council of the Society of Radiographers to deliver the Stanley Melville Memorial Lecture at the British Institute of Radiology, London. I chose as my subject "Thoughts on Function and Design of Diagnostic Departments".

In 1965 the Society of Radiographers held their Annual Conference at Portrush, Northern Ireland. I was particularly pleased that the Council thought fit to honour us thus and during my term of office as Chairman. This conference coincided with my fifty years of active association with radiography and was in fact my "Swan Song", for having been Chairman of the Northern Ireland Branch on two occasions and Branch Nominee for nine years, I felt that for the good of the Branch and in fairness to younger members I should resign my position of office. Following this one of the greatest tributes to my fifty years of X-ray work was paid me by the members of the Northern Ireland Branch, for on September 8th 1965 I was their guest of honour at a dinner in the Woodbourne House Hotel, and was presented with a tape recorder and cheque. For me it was a memorial evening, over eighty radiographers from all parts of Ulster were present and colleagues of earlier days came over from Surrey. The occasion was graced by the President of the Society of Radiographers. The centre piece on the top table was a large iced cake on which was inscribed "Fifty Years and still Radiating". It was indeed a wonderful climax to a long and happy career and I was deeply touched by the friendship and affection of my fellow radiographers.

I cannot close this account of my career in radiography without expressing my gratitude for my happy and encouraging associations over the years with the medical staff of the Royal Victoria Hospital and indeed with many medical friends throughout Northern Ireland.

> May the younger generation profit by the experience
> of their predecessors who had to learn the hard way.

My thanks are due to Dr. R. W. M. Strain for his interest and help.